

## Interim State Forest Management Guidelines to Emphasize Mesic Conifers in the Western Upper Peninsula (WUP)

### **Purpose:**

Provide rationale and guidance for increasing the mesic conifer component by 100% over the next 20-years on state forestlands within the Western Upper Peninsula landscape.

### **Scope:**

These guidelines recommend goals and silvicultural considerations for increasing the proportion of natural stands of mesic conifers; eastern hemlock, white pine, balsam fir, white spruce and red pine; and enhancing the mesic conifer species component in existing deciduous types, in the four Forest Management Units in the WUP.

### **Rationale:**

Historically, fire, insects, disease and windthrow were the primary natural disturbance agents of forests. From about the mid 1800s, timber harvesting became the dominant action influencing forest composition and structure. Natural disturbance and timber harvesting differ in their impacts on forest stands and landscapes. Cutting rotations are generally shorter than natural fire cycles and timber harvest usually results in fewer live trees and less coarse woody debris. Even-aged management cutting rotations change age-class distribution of forest types at the landscape scale resulting in more early successional and young forest and less mature and old growth forest types. Short rotation intervals also influence tree species composition, usually resulting in an increase of deciduous forest species. The increase in early successional and young deciduous forests at the landscape scale, raises concerns about the long-term capability to maintain biological diversity.

The North American Breeding Bird Survey has been conducted in the US and Canada since 1966. Using birds as an example, the number of individuals of deciduous associated bird species are much more abundant in the UP; compared to the number of individuals of coniferous associated bird species. Bird species associated with mesic conifer forest types are more similar when compared to those associated with hardwood forest types. This suggests management of mesic conifers, regardless of species, will increase the number of individuals of conifer associated bird species. In addition, white-tailed deer will be impacted by changes in mesic conifer management. Regenerating and young deciduous forest possess greater potential for producing deer from spring through fall, compared to mesic conifer habitats, due to the abundance and nutritional value of available food. Conifer dominated landscapes have greater potential for wintering deer due to physical characteristics of conifers which intercept snow, reduce wind chills and have warmer temperatures, compared to deciduous stands. The long-term impact of increasing the mesic conifer component should be reduced productivity of summer range and expansion of areas potentially suitable for deer during winter, resulting in a smaller deer herd dispersed over a larger wintering area.

Upland conifers (mesic conifers plus jack pine) were the dominant species on 45% of the WUP landscape (59% excluding Menominee and Delta counties), based on circa 1800 maps, and is similar to the 39% reported for the Luce District in the Eastern Upper Peninsula (EUP). Hemlock (80%) was the mesic conifer species most prevalent in the pre-settlement landscape in the WUP. Most of this hemlock (96%) occurred in mixed stands, where hemlock represented the dominant tree species. The proportion of upland conifer dominated acres had declined to approximately 15% of the WUP by 1935 and to 12% by 1993, the most recent Forest Inventory and Assessment (FIA) assessment. By 1955 the spruce-fir forest was the most prevalent mesic conifer forest type. The first FIA assessment of forest conditions conducted in the WUP (excluding Menominee and Delta Counties) in 1935, reported approximately equal proportions of sugar maple and hemlock sawlog volumes, and hemlock and northern hardwoods were collectively classified hemlock-hardwoods. The steepest decline in mesic conifers occurred in the WUP from circa 1800 to 1935,

however, the decline has continued from the 1935 to 1993 period, and the species composition of mesic conifers has shifted from hemlock to spruce-fir dominance.

A pilot project to assess change in the amount and extent of forest cover types from circa 1800 to 2000 Operations Inventory (OI) in the Escanaba and Gwinn FMUs indicated hemlock declined 95% (116742 vs 5498 acres), white pine increased 19% (4937 vs 5866 acres), red pine declined 73% (37234 vs 10119 acres) and spruce-fir was unchanged (14470 vs 14500 acres). Aspen increased 1230% (7678 vs 102153 acres) and northern hardwoods increased 89% (33411 vs 63200 acres). Approximately equal proportions of hemlock dominated sites were converted to aspen and northern hardwoods, while the majority of red pine was converted to aspen.

Between 1988 and 2001, mesic conifers decreased 4.5% on state forestland in the WUP. This is somewhat misleading, however, because red pine, white pine and hemlock increased slightly, but, the spruce-fir forest type, which represented 52% of the mesic conifers in 1988, declined 11080 acres, or 28%. In May 2001, mesic conifers (using ½ of the red pine acreage due to the estimate that ½ is in plantations and does not possess the same value or function as natural stands) represented 6.7% of the state forestland in the WUP. Mesic conifers collectively represented 39% of the WUP pre-settlement landscape and 43%, 42%, 37% and 29% of the Gwinn, Crystal Falls, Baraga and Escanaba FMUs, respectively. Currently, mesic conifers represent 8.6%, 7%, 6.5% and 9.1% of the Gwinn, Crystal Falls, Baraga and Escanaba FMUs.

Based on the historical extent and abundance of the mesic forest species, existing forest conditions, historical documents and existing environmental conditions (including deer numbers) emphasis will be prioritized for mesic conifer species by FMUs:

FMU	Mesic Conifer Species Group			
	<u>Hemlock</u>	<u>Spruce/Fir</u>	<u>Red Pine</u>	<u>White Pine</u>
Baraga	1	3	3	2
Crystal Falls	2	2	1	1
Escanaba	3	1	2	1
Gwinn	1	3	2	1

Priority

1=Highest; 2=Moderate; 3=Lowest

This prioritization only addresses the possibilities for enhancement or expansion of mesic conifers. It does not address the maintenance of existing mesic conifers; for example, maintenance of within stand components and natural stands of hemlock may rate high priority where deer numbers are high, and there is little or no chance of increasing hemlock.

**Responsibility and Authority:** Department of Natural Resources Wildlife, Forest, Minerals and Fire Management, and Fisheries

#### **Procedure:**

Based on current 2001 Operations Inventory (OI) information spruce-fir comprises 28,000 acres (48%); natural red pine 11,000 acres (estimated ½ of existing acres was in natural conditions) (19%); white pine 11,000 (19%) acres; and hemlock 8300 (14%) acres, for a total of 58,000 acres. The goal is to increase mesic conifers by 57,000 acres, to 115,000 acres by 1) enhancing the within stand component of mesic conifers in hardwood dominated forest types; and 2) expanding the mesic conifer forest types.

The objectives for increasing mesic conifers on state forestland are: 12,000 acres of hemlock; 14,000 acres of balsam fir-white spruce; 10,000 acres of natural red pine; and 21,000 acres of white pine. Operations Inventory and IFMAP assessment and classification must accurately reflect existing site conditions and not a desired future condition or management option preferred

by the stand examiner. Based on review of species-product codes and regeneration and stocking summaries from current OI, approximately 17% of the northern hardwood and red maple, 7.5% of the aspen, and 10% of the jack pine forest types will be impacted by emphasizing mesic conifers. Forest and Wildlife field personnel within the individual FMUs will evaluate opportunities for enhancement or expansion of mesic conifers on a site-specific bases.

Identification of sites for mesic conifer emphasis may include; reviewing circa 1800 cover type maps to determine the occurrence and extent of mesic conifers, using digital ortho quads to identify the presence of mesic conifers, soil maps, WUP habitat classification guides, field assessment of existing stand conditions, presence of mesic conifer stumps, topography, historical publications and personal accounts, and field experience and knowledge.

### **Spruce-Fir**

The objective for white spruce and balsam fir is to increase the spruce-fir forest type by 14,000 acres, to 42,000 acres. This represents a 50% increase over existing conditions. The 42,000 acres approximates the 39,000 acres of spruce-fir existing on state forestland in 1988. Emphasis will be placed on identifying mixed conifer-hardwood stands containing a spruce-balsam component either in the overstory or regeneration layers, and applying silvicultural treatments appropriate to enhance spruce-fir in the future stand condition.

Management for emphasizing spruce-fir will result in increased rotation lengths and less even-aged silviculture. Scarification or hand planting will probably be limited, although some white spruce planting may be justified. Based on OI information, including species-product codes and species composition and stocking of regeneration in aspen and northern hardwood stands, all FMUs have potential for spruce-fir management emphasis. Approximately 60% of the potential for expansion and enhancement of the spruce-fir component may occur in stands classified as aspen, and about 40% in red maple and poorer quality northern hardwoods. Spruce-fir and white pine should be emphasized in the Crystal Falls and Escanaba FMUs due to high deer populations within these FMU.

### **White Pine**

The objective is to increase white pine by 21,000 acres to 32,000 acres, representing an approximate 2-fold increase from the existing 11,000 acres. The occurrence of white pine in the circa 1800 data appears underrepresented, based on the presence of white pine stumps on state forestland in the WUP. The priority for emphasizing white pine is high on the Crystal Falls, Escanaba and Gwinn FMUs due to its past distribution, potential based on overstory conditions and presence of advance reproduction in existing stands, and high deer numbers precluding hemlock management in the Escanaba and southern portions of Crystal Falls and Gwinn FMUs. The presence of white pine reproduction in aspen, white birch and northern hardwood forest cover types suggest these types should be evaluated closely for white pine enhancement or conversion.

Potential silvicultural prescriptions should focus on manipulating overstory species composition and stocking to encourage white pine seedlings, or release advance white pine reproduction. Uneven-aged management, or leaving/markings sufficient overstory trees to provide shade and seed will reduce even-aged management where white pine is emphasized. Many areas that historically contained white pine but do not currently have white pine in the tree or regeneration layers, may require re-establishment of the white pine component through hand planting. This will require adequate lead-time to allow growing containerized stock, identifying planting personnel and planting at a rate of 150-300 trees/acre.

### **Hemlock**

The objective is to increase hemlock by 12,000 acres from the existing 8,300 acres. The 12,000 acre increase will primarily result from objective assessment and classification of hemlock currently existing, but identified as northern hardwoods; manipulating site conditions to enhance hemlock; and underplanting where hemlock has been eliminated as a stand component. Based

on the knowledge and experience of local Forest Management and Wildlife personnel, decisions must be made regarding whether the best approach is to consider hemlock a component of northern hardwood stands, or to identify and delineate hemlock clumps/patches. The maintenance and perpetuation of hemlock is the highest priority on state forestland in the WUP, due to the 95% decline from pre-settlement conditions, and its sensitivity to environmental conditions, including deer browsing.

Hemlock emphasis is a high priority on the Baraga and Gwinn FMUs. Management actions emphasizing hemlock should be implemented only where the potential for increasing the hemlock component outweighs the risks imposed by other environmental conditions within the FMU. For example, areas in both the Baraga and Gwinn FMUs have the potential for hemlock emphasis, but due to existing and projected deer numbers; regeneration may be suppressed or eliminated before it is recruited to a height where deer could not browse the reproduction.

Timber harvesting may occur within existing hemlock stands and within northern hardwoods containing a hemlock component. About 10% (range 7%-15%) of the hemlock may be entered over the 20-year period. This level of harvest allows sufficient time to have elapsed and provide proper monitoring and assessment of results to achieve the desired future forest condition. This is a conservative approach, but warranted due to the present extent and condition of the hemlock resource. Silvicultural prescriptions will emphasize providing suitable seedbeds for hemlock germination and survival, and manipulating light levels by altering stand basal areas and species composition of the overstory and understory tree layers. Management for hemlock will result in more group selection and reduced basal areas than currently is employed in northern hardwood management. Prescriptions will include consideration of the shallow rootedness of hemlock and its susceptibility to windthrow. Evidence of the historical presence of hemlock occurring on a site, but hemlock having been eliminated, may require re-establishment through hand planting. Hand planting of containerized hemlock should approximate 200-300 trees/acre.

### **Red Pine**

Red pine will be increased by 10,000 acres to approximately 21,000 acres, with the increase emphasized on the Crystal Falls, Escanaba and Gwinn FMUs. The majority of red pine that was identified as existing during pre-settlement conditions has been converted to aspen.

Regenerating and young aspen stands, containing scattered red pine pole and sawlogs, may be managed by extending the rotation for harvesting aspen or marking aspen for harvest. Leaving overstory trees to discriminate against aspen regeneration, and red pine seed trees, provides openings for red pine regeneration and a seed source. In many cases, red pine seedlings will have to be re-established in areas devoid of red pine, but identified as having potential for enhancing red pine. Active management for red pine will emphasize poor quality northern hardwoods or aspen, with some conversion on higher quality jack pine sites. Re-establishment of red pine on a site will only include hand planting, not machine planting or use of herbicide.

### **Assessment and Monitoring**

Monitoring changes from existing conditions will be through the Operations Inventory and Compartment Review process. Changes from the existing forest cover types, indicating a change from hardwood to conifers and vice versa, will be recorded and compiled to provide information on changes over the 20-year period. IFMAP procedures should not alter this process if OI data is used as the base for comparison.

Monitoring the results of silvicultural prescriptions intended to enhance or expand mesic conifers will have to be developed.

A qualitative system for assessing the impact of deer browsing on tree regeneration and recruitment should be developed and implemented to provide a practical approach to evaluate the intensity of deer browsing on tree species.

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